Trend Study 17-42-97

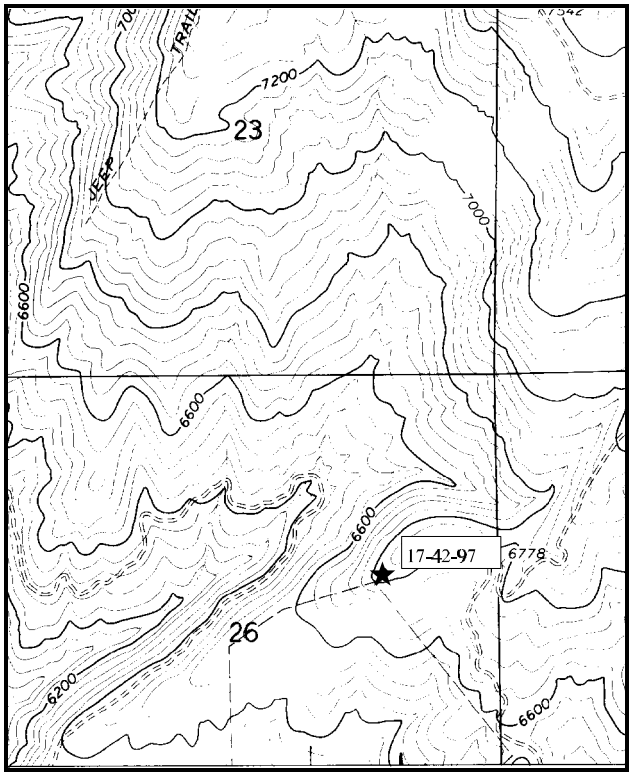
Study site name: Tank Hollow . Range Type: Mixed mountain brush

Compass bearing: frequency baseline 191 degrees.

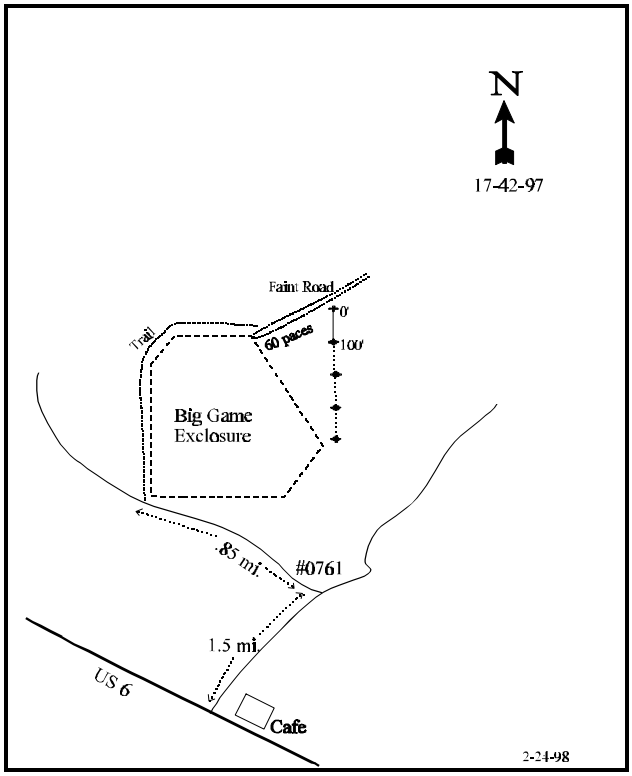
First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Turn north off of Highway US-6 (near mile post 195) onto the new Sheep Creek road. Go 1.5 miles on the paved road to an intersection with Forest Service road #076. Turn left and go west 0.8 miles to a fence. Continue 0.05 miles on the road to the southwest corner of a large exclosure. Park here, and follow the trail along the outside of the exclosure to the northeast corner. Continue 60 paces northeast along an old road, the 0-foot stake is 3 paces off the right side of the road. The study runs south. This study area can also be reached from the north, from Forest Service road #076 (Teat Mountain), but as the secondary road to the exclosure has been closed, it involves a longer hike.



Map Name: Ray's Valley .



Diagrammatic Sketch

Township 9S , Range 5E , Section 26

UTM 4428250.482 N, 471834.146 E

DISCUSSION

Trend Study No. 17-42 (27-16)

The Tank Hollow study is on the south side of a small knoll located immediately north of the large big game exclosure in Tank Hollow. This is a known deer wintering area (38% pellet-group frequency), which in recent years, has experienced increasingly heavy elk use (36% pellet-group frequency). Pellet groups of both species are abundant. Much of the surrounding area is dense oakbrush or north facing mahogany slopes. Below the study site, mixed juniper-pinyon and big sagebrush has been chained and seeded to help improve forage conditions. The study site itself is a mixed mountain brush type on a moderate (20%) south to southeast slope with an elevation of 6,800 feet.

Soil textural analysis indicates it to be a clay loam with a neutral pH (7.1). There are rocks throughout the profile with a B horizon located about 30 inches below the soil surface. Effective rooting depth (see methods) is almost 17 inches and soil temperature is a cool 46 degrees. The soil is limiting for both phosphorous and potassium which could be restrictive to plant development. The site is potentially erodible but currently is relatively stable. A combination of vegetative, litter cover, and moderate slope helps limit erosion. Some slight erosion was reported in the past, but currently there is none apparent.

Mountain big sagebrush density was estimated at 1,720 plants/acre in 1997. Percent decadency, while estimated at 55% in 1989, has dropped to 31% in 1997. The ratio dead to live plants is almost 1 to 5, or 360 plants/acre. It appears that there will be more plants lost in the future with 74% of the decadent plants classified as dying. There were no seedlings, yet a few young plants were encountered (5% of population). Utilization is mostly moderate, where the majority of the use in the past was mostly heavy (56%). The bitterbrush population was currently estimated at 1,960 plants/acre, most of which were classified as mature. Height and crown measurements have doubled since 1989. All plants exhibit good vigor and no decadent or dead plants were encountered. Although true mountain mahogany was mentioned as being on the site in 1983, no plants were sampled until the sample size was greatly enlarged in 1997. The density is now estimated at 320 plants/acre. These plants are heavily hedged but show good vigor. The most abundant shrub is broom snakeweed with an estimated density of 5,420 plants/acre. The age structure of this population would indicate an expanding population at this time. Photo's from all years show an obvious increase in the size of Utah juniper. Point-center quarter data estimates the Utah juniper density at a relatively low 22 trees/acre. Other scattered species include stickyleaf rabbitbrush, snowberry, Gambel oakbrush, Oregon grape, and prickly pear cactus.

Grass composition is moderately diverse with no single species being overly dominate. Sandberg bluegrass nested frequency has significantly increased since 1989. Cheatgrass is scattered throughout the site but is not abundant. Overall, grass utilization is light and vigor is good.

As reported in 1983, forbs are more abundant and certainly more diverse than grasses. Species composition is a mixture that generally is of fair forage value. Utilization of forbs is light and no single species is strongly increasing or decreasing in density.

1983 APPARENT TREND ASSESSMENT

According to the apparent trend evaluation rating, soil trend is stable for all nine graded categories. Vegetative trend is less certain. Mountain big sagebrush may be declining and Utah juniper shows evidence of a slow increase. Other browse species are vigorous but rather heavily hedged. Herbaceous plants are stable and of good quality. The principle threat to this area is increased activity associated with oil and gas exploration and road building activity.

1989 TREND ASSESSMENT

An increase in the percent vegetative basal cover from 1% to 14%, with the concurrent decrease in bare soil from 30 to 23%, indicate a stable trend. On the study site itself, the mountain big sagebrush, bitterbrush, serviceberry and mountain mahogany tend to be heavily hedged, more so than in 1983. The rocky, clay loam soil shows evidence of slight erosion and compaction. With the apparent decline in the key browse species and heavy use on all browse, the vegetative trend is downward. The herbaceous understory is still moderately dense and diverse. The data indicate a fairly stable population.

1997 TREND ASSESSMENT

Soil trend is slightly upward. Vegetative and litter cover are abundant and there is little erosion apparent. Percent bare ground has declined through all years. Browse trend is stable with only slightly less utilization then reported in the past. Biotic potential is low for nearly all species. The herbaceous understory trend is stable. Nested frequency for grasses and forbs has changed only slightly over the years.

TREND ASSESSMENT
soil - slightly upward
browse - stable
herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 17 , Study no: 42

Type	Species	Nested Frequency '83	'89	'97	Quadrat Frequency '83	'89	'97	Average Cover % '97
G	Agropyron cristatum	a29	b62	b80	11	23	27	5.39
G	Agropyron intermedium	a37	b52	b49	17	18	16	2.48
G	Agropyron spicatum	48	51	27	20	17	11	1.02
G	Bromus carinatus	6	3	5	2	1	2	.06
G	Bromus tectorum (a)	-	-	70	-	-	27	.93
G	Oryzopsis hymenoides	6	5	6	4	3	2	.06
G	Poa fendleriana	14	13	3	8	5	2	.01
G	Poa pratensis	-	-	5	-	-	2	.66
G	Poa secunda	a-	a4	b43	-	2	17	1.38
G	Sitanion hystrix	3	-	-	1	-	-	-
Total for Grasses		143	190	288	63	69	106	12.02
F	Agoseris glauca	-	-	-	-	-	-	.01
F	Allium spp.	a10	b83	a19	6	38	12	.06
F	Arabis spp.	b29	a4	a8	14	2	3	.04
F	Artemisia dracunculus	3	-	-	1	-	-	-
F	Astragalus beckwithii	-	-	4	-	-	3	.21

Type	Species	Nested Frequency '83	'89	'97	Quadrat Frequency '83	'89	'97	Average Cover % '97
F	Aster chilensis	23	17	24	8	6	8	.93
F	Astragalus convallarius	a-	a-	b10	-	-	4	.04
F	Astragalus spp.	-	-	2	-	-	1	.00
F	Balsamorhiza sagittata	-	-	1	-	-	1	.15
F	Castilleja linariaefolia	-	-	4	-	-	2	.03
F	Camelina microcarpa (a)	-	-	14	-	-	6	.05
F	Chenopodium album	-	-	2	-	-	1	.00
F	Chaenactis douglasii	ba62	a7	a-	31	3	-	-
F	Cirsium spp.	55	36	50	29	18	25	1.75
F	Collomia linearis (a)	-	-	8	-	-	4	.02
F	Comandra pallida	ab19	b27	a3	8	12	2	.02
F	Collinsia parviflora (a)	-	-	23	-	-	8	.04
F	Crepis acuminata	a7	b45	b56	4	23	26	.57
F	Cryptantha spp.	7	-	-	4	-	-	-
F	Descurainia pinnata (a)	-	-	7	-	-	3	.01
F	Eriogonum brevicaule	ab8	b9	a-	3	5	-	-
F	Erigeron pumilus	-	-	1	-	-	1	.00
F	Hackelia patens	58	69	79	26	35	36	3.04
F	Lappula occidentalis (a)	-	-	5	-	-	2	.01
F	Linum lewisii	a42	a27	b161	20	16	61	6.36
F	Lithospermum ruderale	6	16	5	5	6	2	.33
F	Lomatium spp.	a-	b44	b33	-	22	18	.24
F	Machaeranthera canescens	b75	a3	a7	39	2	3	.06
F	Microsteris gracilis (a)	-	-	5	-	-	2	.01
F	Penstemon humilis	19	11	8	8	7	3	.06
F	Phlox longifolia	b86	b102	a45	38	39	20	.29
F	Polygonum douglasii (a)	-	-	1	-	-	1	.00
F	Senecio multilobatus	3	4	7	1	2	4	.09
F	Streptanthus cordatus	6	4	9	2	2	3	.16
F	Taraxacum officinale	-	3	-	-	2	-	-
F	Tragopogon dubius	b30	a4	a17	19	2	7	.06
F	Veronica biloba (a)	-	-	155	-	-	49	1.44
F	Vicia americana	a21	a23	b74	10	12	31	1.54

Type	Species	Nested Frequency '83	'89	'97	Quadrat Frequency '83	'89	'97	Average Cover % '97
F	Viola spp.	-	-	3	-	-	1	.00
F	Zigadenus paniculatus	$_{ab}$2	$_{b}$9	$_{a}$-	2	5	-	-
Total for Forbs		571	547	850	278	259	353	17.74

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 17 , Study no: 42

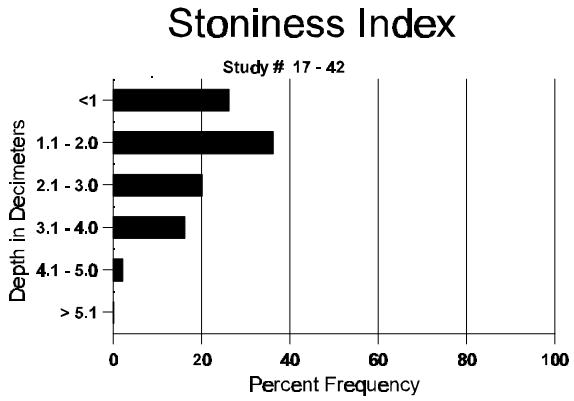
Type	Species	Strip Frequency '97	Average Cover % '97
B	Amelanchier alnifolia	8	.56
B	Artemisia tridentata vaseyana	63	13.34
B	Cercocarpus montanus	12	1.14
B	Chrysothamnus viscidiflorus viscidiflorus	23	1.96
B	Gutierrezia sarothrae	53	1.99
B	Juniperus osteosperma	4	2.49
B	Mahonia repens	1	.03
B	Opuntia spp.	1	-
B	Purshia tridentata	55	9.88
B	Quercus gambelii	3	.41
B	Symphoricarpos oreophilus	25	2.11
Total for Browse		248	33.94

BASIC COVER --
Herd unit 17 , Study no: 42

Cover Type	Nested Frequency '97	Average Cover % '83	'89	'97
Vegetation	358	1.25	14.00	52.99
Rock	155	4.50	5.75	4.18
Pavement	155	3.25	6.25	1.67
Litter	396	61.00	51.25	53.51
Cryptogams	26	0	0	.31
Bare Ground	234	30.00	22.75	11.94

SOIL ANALYSIS DATA --
Herd Unit 17 Study no: 42

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
16.5	46.4 (17.3)	7.1	25.4	34.7	39.8	3.4	6.9	64.0	.7



PELLET GROUP FREQUENCY --
Herd unit 17 , Study no: 42

Type	Quadrat Frequency '97
Rabbit	1
Elk	36
Deer	38

BROWSE CHARACTERISTICS --
Herd unit 17 , Study no: 42

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier alnifolia																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	1	-	-	1	-	-	2	-	-	-	40			2
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	2	2	-	-	-	-	-	-	-	4	-	-	-	80			4
M	83	-	1	-	-	-	-	-	-	-	1	-	-	-	66	25	17	1
	89	-	-	-	-	1	-	-	-	-	1	-	-	-	66	23	15	1
	97	2	-	1	2	-	1	-	-	-	6	-	-	-	120	32	33	6
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	1	-	-	1	-	-	-	66			1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	100%	00%	00%	+50%
'89	50%	00%	00%	+34%
'97	20%	20%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	66	Dec:	0%
	'89	132		50%
	'97	200		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	1	1	-	-	-	-	-	-	-	2	-	-	-	133			2
	97	2	-	-	2	-	-	-	-	-	4	-	-	-	80			4
M	83	4	12	10	-	-	-	-	-	-	26	-	-	-	1733	31	37	26
	89	1	5	11	-	1	-	-	-	-	18	-	-	-	1200	24	43	18
	97	14	29	8	2	2	-	-	-	-	55	-	-	-	1100	30	46	55
D	83	1	6	3	-	-	-	-	-	-	10	-	-	-	666			10
	89	6	5	13	-	-	1	-	-	-	19	-	1	5	1666			25
	97	3	16	3	3	2	-	-	-	-	7	-	-	20	540			27
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	360			18

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	50%	36%	00%	+20%
'89	27%	56%	13%	-43%
'97	57%	13%	23%	

Total Plants/Acre (excluding Dead & Seedlings)				
'83	2399	Dec:		28%
'89	2999			56%
'97	1720			31%

Cercocarpus montanus																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	3	10	-	-	2	-	-	-	14	1	-	-	300	33	40	15

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	None
'89	00%	00%	00%	Appeared
'97	19%	75%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'83	0	Dec:	-
'89	0		-
'97	320		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	83	6	-	-	-	-	-	-	-	-	6	-	-	-	400	10	17	6
	89	8	-	-	-	-	-	1	-	-	9	-	-	-	600	11	13	9
	97	68	-	-	-	-	-	-	-	-	68	-	-	-	1360	12	17	68

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	+33%
'89	00%	00%	00%	+59%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	400	Dec:	-
	'89	600		-
	'97	1460		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	20	-	-	-	-	-	-	-	-	20	-	-	-	400			20
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	60	-	-	-	-	-	-	-	-	60	-	-	-	1200			60
M	83	36	-	-	-	-	-	-	-	-	36	-	-	-	2400	12	8	36
	89	42	-	-	5	-	-	1	-	-	48	-	-	-	3200	10	10	48
	97	210	-	-	-	-	-	-	-	-	210	-	-	-	4200	10	10	210
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	8	-	-	-	-	-	-	-	-	4	-	-	4	533			8
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	+36%
'89	00%	00%	07%	+31%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	2400	Dec:	0%
	'89	3733		14%
	'97	5420		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Juniperus osteosperma																		
M	83	1	-	1	-	-	-	-	-	-	2	-	-	-	133	67	12	2
	89	-	-	-	1	-	-	-	-	-	1	-	-	-	66	106	79	1
	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80	82	79	4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	50%	00%	-50%
'89	00%	00%	00%	+18%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	133	Dec:	-
	'89	66		-
	'97	80		-

Mahonia repens																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	1	-	-	1	-	-	-	20			1
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	3	-	-	3	-	-	-	60	3	6	3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	None
'89	00%	00%	00%	Appeared
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	0	Dec:	-
	'89	0		-
	'97	80		-

Opuntia spp.																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	4	5	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	None
'89	00%	00%	00%	Appeared
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	0	Dec:	-
	'89	0		-
	'97	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Purshia tridentata																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	1	-	-	1	-	-	-	20			1
Y	83	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	89	-	-	-	1	-	-	-	-	-	1	-	-	-	66			1
	97	6	7	1	-	-	-	-	-	-	14	-	-	-	280			14
M	83	20	4	4	-	-	-	-	-	-	27	1	-	-	1866	16	19	28
	89	-	7	12	-	3	1	-	-	-	23	-	-	-	1533	15	24	23
	97	4	22	19	2	22	15	-	-	-	84	-	-	-	1680	29	49	84
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	1	5	1	-	-	-	-	-	-	7	-	-	-	466			7
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	13%	13%	00%	- 0%
'89	48%	45%	00%	- 5%
'97	52%	36%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'83	2066	Dec:	0%	
'89	2065		23%	
'97	1960		0%	

Quercus gambelii																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	1	-	-	1	-	-	-	20			1
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40	51	35	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	None
'89	00%	00%	00%	Appeared
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'83	0	Dec:	-
'89	0		-
'97	140		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Symphoricarpos oreophilus																		
S	83	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	83	7	-	-	-	-	-	-	-	-	7	-	-	-	466			7
	89	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	83	27	-	-	-	-	-	-	-	-	27	-	-	-	1800	19	14	27
	89	3	6	-	6	1	-	13	-	-	13	-	-	16	1933	15	14	29
	97	17	-	-	28	-	-	-	-	-	45	-	-	-	900	18	36	45

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	- 6%
'89	22%	00%	50%	-53%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	2266	Dec:	-
	'89	2133		-
	'97	1000		-